

Appl. No. : 10/0460
Filed : January 14, 2002

AMENDMENTS TO THE SPECIFICATION

Please amend the specification as follows:

(3) [0065] In some embodiments of the present invention, ferrate is produced by chemical oxidation of the iron salt. The chemical oxidation is performed by mixing an oxidizing agent, or a solution containing the oxidizing agent, with the iron salt, or with the solution containing the iron salt. In some embodiments, the oxidizing agent, or a solution containing the oxidizing agent, is added to the iron salt, or to the solution containing the iron salt, whereas in other embodiments, the iron salt, or the solution containing the iron salt, is added to the oxidizing agent, or to a solution containing the oxidizing agent. An "oxidizing agent" is a chemical compound that oxidizes another compound, and itself is reduced. In certain embodiments, the oxidizing agent comprises at least one of the following: a hypohalite ion, a halite ion, a halate ion, a perhalate ion, ozone, ~~exone~~ **OXONE**[®], halogen, a peroxide, a superoxide, a peracid, a salt of a peracid, and Caro's acid, or a combination thereof.

(62) [0093] The mixing mechanism may be a tortuous path, a mixing device or an aspirator. ~~Exone~~ **OXONE**[®] or Caro's Acid or other strong oxidant in container is added to the static mixer. The term "**OXONE**[®]" as used herein refers to potassium peroxyomonopersulfate or potassium monopersulfate. Reaction begins instantaneously and generates heat. The temperature of the reaction is adjusted through the use of a cooling coil or cooling jacket to a temperature of about -10 °C. Temperature is controlled through a feed forward feed back control mechanism. Water is employed as a transport medium for transporting the ferric sulfate, oxidant and reaction products. The volume of the water is minimized to a volume that maximizes ferrate production yield.

(83) [0107] In another embodiment reactants described above are added to a reactor cooled to a temperature of 20 °C. After about 180 minutes, reaction products are treated with KOH, to solubilize any precipitated ferrate and the entire mixture is transferred to water or wastewater or sludge for treatment. For one embodiment, effluent from the reactor includes unreacted ferric sulfate, unreacted ~~exone~~ **OXONE**[®], potassium sulfate, KOH and about 20% dissolved ferrate. The presence of KOH and ferric ions retard the decomposition rate with water as the product stream is being mixed with untreated water.

(84) [0116] While oxidants of ~~exone~~ **OXONE**[®], Caro's acid, peroxide/superoxide, chlorine and hypochlorite are described herein, it is understood that other oxidants may be

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suitable for use. Some of these oxidants are described in an article on ferrate oxidants in *Grazzino Italiano* by Losanna. It is believed that enzymes may also be usable in ferrate process embodiments of the present invention to reduce reaction temperature.

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[0234] The above method, where the oxidizing agent comprises at least one of the following: a hypohalite ion, a halite ion, a halate ion, a perhalate ion, ozone, ~~exone~~ OXONE[®], halogen, a peroxide, a peracid, a salt of a peracid, and Caro's acid, or a combination thereof.

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[0247] The above method, where the oxidizing agent comprises a component selected from the group consisting of a hypohalite ion, a halite ion, a halate ion, a perhalate ion, ozone, ~~exone~~ OXONE[®], halogen, a peroxide, a peracid, a salt of a peracid, and Caro's acid, or a combination thereof.

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[0267] The above system, where the oxidizing agent comprises a component selected from the group consisting of a hypohalite ion, a halite ion, a halate ion, a perhalate ion, ozone, ~~exone~~ OXONE[®], halogen, a peroxide, a peracid, a salt of a peracid, and Caro's acid, or a combination thereof.

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[0317] The above method, where the oxidizing agent comprises a component selected from the group consisting of a hypohalite ion, a halite ion, a halate ion, a perhalate ion, ozone, ~~exone~~ OXONE[®], halogen, a peroxide, a peracid, a salt of a peracid, and Caro's acid, or a combination thereof.

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